The inception of these depressions is due to special conditions on the Adriatic slope. We may affirm these conditions to be, very limited thermal differences in comparison with those of adjoining regions, followed by decreases in pressure. In this case, under the influence of important depressions existing over northern Europe, there form on the Adriatic depressions which one may consider as secondaries.

If an anticyclone is present at the same time in north or northwest Europe, the depression develops more deeply and forms a growing cyclone. The gradients increased almost equally in the various sectors, and, coincident with an extension of the area of the cyclone, the pressure decreases, and the cyclone moves toward the east, while the anticyclone likewise shows a movement, but toward more southern latitudes.

However, if the western anticyclone, which we may assume to be well developed, influences the movement of these secondary depressions, the other anticyclone, which exists over the Levant, exerts an influence which is not less important. We may regard this anticyclone as an indefinite one, because it does not represent in general more than a zone of relatively high pressure as compared with that of adjacent regions.

The two currents of air, the one cold, the other warm, which, according to the theory of Bjerknes, are necessary to the formation of a depression, may be engendered by these two anticyclones, which lie, the one in northwestern, the other in southeastern Europe. [Details of depression of December 20 and 21, 1923.]

These depressions form preferably during the winter months and are entirely lacking in summer, for the distribution of air temperature at that season facilitates their formation in the valley of the Po.

Thus, the conditions favorable to the formation of these secondary depressions would be the following: A very marked cyclone over northern Russia, and two areas of high pressure extending, the one over the British Isles, the other over the Levantine Sea [eastern Mediterranean]. The depressions, as soon as they are formed, move as a function of the movement which the anticyclones undergo. The anticyclone dominant in the Levantine Sea thus exercises the major influence.

NOTES ON THE WEST INDIAN HURRICANE OF OCTOBER 14-23, 1924

By Charles L. Mitchell

[United States Weather Bureau, Washington, D. C.]

Recent reports indicate that the hurricane of October 14–23, 1924, was one of great intensity. Dr. José C. Millas, director, Observatorio Nacional, Habana, Cuba, writes: "I believe that this hurricane is one of the most severe ever experienced in our latitudes." Doctor Millas has forwarded a number of photographs clipped from El Mundo, Habana, taken in Los Arroyos and Arroyos de Mantua, Pinar del Rio Province, which suggest that the force of the wind was almost comparable to that in a tornado. The steel wireless tower at La Fe was blown down.

It is, indeed, fortunate that this hurricane passed over no land areas other than the extreme western end of Cuba and a very sparsely settled region in southern Florida. Full details of damage done by it have not been received from western Cuba. Press reports indicate that in Arroyos de Mantua about a dozen persons were killed and 50 injured and that almost every building in the town sustained heavy damage, besides the severe damage done to the tobacco crop. A maximum wind velocity of 72 miles an hour from the south was registered at Habana at 10 p. m. of the 19th, although the barometer fell little, if any, below 29.50 inches. The lowest pressures observed at a number of stations in western Cuba and also very complete barometric data from the S. S. *Toledo*, all kindly furnished by Dr. Millas, are given below:

CUBAN STATIONS, OCTOBER 19, 1924

	Inches
Guane	28.97
Dimas	28.54
La Fe	28.35
Pinar del Rio	29.28
Mantua	28.15
Los Arroyos	27.52

S. S. "TOLEDO" NEAR JUTIAS CAY (OFF THE NORTHWESTERN COAST)

Time, Oct. 19	Wind direction	Wind force	Pressure
			Inches
Noon	E. by N	11	29.18
1:00 p. m	E. by N	12	28.78
2:00 p. m	East		
	ESE	12	28.06
2:10 p. m	ESE	12	27.87
2:15 p. m	ESE	12	27.72
2:25 p. m	ESE	12	27.59
2:33 p. m	ESE	12	27.48
2:40 p. m	SE	12	27.44
2:50 p. m	SE	12	27.36
3:00 p. m	SE	12	27.28
3:15 p. m	SE	12	27.26
3:30 p. m	SSW	6	27.22
	WSW	8	
3:55 p. m	SSW	12	27.26
4:10 p. m	WSW	12	27.28
4:20 p. m	West	12	27.40
4:30 p. m	WNW	12	27.52
4:50 p. m	WNW	12	27.87
5:00 p. m	WNW	12	28.11
5:20 p. m	WNW	12	28.39
5:30 p. m	WNW	12	28.54
6:00 p. m	WNW	12	28.80
7:00 p. m	WNW	12	29.11
7:30 p. m	WNW	11	29.19
8:00 p. m	WNW	11	29.25
9:00 p. m	WNW	11	29.33

The following extracts are from a report of an interview that the meteorologist of the Panama Canal Zone had with Captain Burmeister, master of the United Fruit Steam Ship *Heredia*:

* * * At about 7 p. m. (October 18) all three ships (the *San Bruno*, *Turrialba*, and *Heredia*) left Havana Harbor and preceded toward Cape San Antonio. At first there was practically no wind, but as they steamed west the wind went around to east and northeast and gradually freshened up. There was a fairly heavy following sea. The wind gradually became heavier and the sea higher. At about 3 a. m. (October 19) the master of the *San Bruno* * * * decided that the center (of the storm) was to the westward and he radioed the other ships that he was going to turn around and steam toward the northeast. After debating at some length, Captain Burmeister also decided to turn around. At this time the ships position was about 23° 50′ N. and 84° 10′ W. The ship was headed north-northeast for a while and then north. The pressure dropped steadily. At 4 a. m. the barometer read 29.56 inches and the wind northeast force 4. At 6 a. m. the sea was so high that the captain decided to heave to. A message to that effect was sent to the two other ships. At 8 a. m. the pressure was 29.44 and the wind had risen to northeast 8. The ship was empty and it bobbed around like a cork. At 11 a. m. the pressure was 29.15 and the wind northeast 11. * * * At noon the barometer read 28.10 inches. This was a drop of 1.05 inches in one hour. At that hour the wind was blowing from the northeast force 12. The following is a vivid description of the storm at its height by Captain Burmeister:

"The whole sea was a boiling, seething mass. It was impossible to see any distance. It appeared as if the surface were covered with a mass of turbulent steam. The sea was breaking in such manner that it was impossible to tell whether the water in the air was rain or sea water. I estimated the wind to be blowing 120 m. p. h. I ordered every pound of steam to be used in keeping her under control."

There was water in the staterooms and even in the captain's room on the bridge. The following note was written in the log at about this time:

"Hurricane winds with high seas. Ship laboring heavily. Taking heavy seas over forward and after decks."

The pressure dropped to its lowest point at 1 p. m., 28.05 inches (a test of this barometer at 28 inches showed that it was reading too high by 0.20 inch, making the corrected reading 27.85 inches). From 11 a. m. to 2 p. m. the wind blew with hurricane force, and waves were mountainous. After 1 p. m. the pressure rose quickly and by 4 p. m. it was 29.20. At 5 p. m. there was noted a backing of the wind, although the velocity was still high, north-northeast 10. As the wind continued to back the velocity decreased. By midnight the pressure had risen to 29.55 and the wind blew from the northwest with a force of 6.

The following is quoted from the report of the official in charge of the Weather Bureau office at Key West:

The storm's center at its nearest approach to Key West was 90 miles distant. This was about noon of the 20th, when the center bore northwest.

Notwithstanding the strong and consistently increasing winds which began during the night of the 19th and which culminated at 2 p. m. of the 20th with a maximum velocity of 66 miles an hour from the southwest, this storm caused no damage in Key West aside from some little damage to trees and shrubbery. There was no damage to shipping whatsoever. This was unusual in the face of a wind that for 17 hours maintained a velocity averaging 51 miles an hour, with gusts ranging from 54 to 74 miles an hour, and can be ascribed only to timely and persistent warnings issued by the Weather Bureau. Taking advantage of these warnings, all vessels, large and small, were made secure, windows and doors battened, and in a number of cases trees trimmed in order to lessen the wind effect and possibly save them.

As a result of warnings broadcast by radio, several vessels sought refuge in port. All P. & O. steamers were held on advice from this office. The following vessels were held in port pending the passage of the storm: Steamers *W. F. Burdell*, *J. R. Gordon*, *Roanoke*, *Estrada Palma*, *Henry M. Flagler*, *Joseph R. Parrott*, *Miami*, *William Islam*, and *Governor Cobb*, and the schooner *Mary Thompson*.

The bureau's work on this hurricane has called forth much praise from outside sources.

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NOTES, ABSTRACTS, AND REVIEWS

WETTERVORHERSAGE (WEATHER FORECASTING)[1]

This volume is No. XI in the series of natural science publications brought out by Dr. Raphael Ed. Leisegang, Frankfurt-am-Main. The author, Doctor Georgii, is instructor in meteorology in the University of Frankfurt and has written a number of papers on meteorological subjects, especially within the last few years.

After sketching in Chapter I the development of weather forecasting since the time of Dove and indicating the synoptic weather reports available to European forecasters, together with the means of collecting and charting them, the author proceeds, in Chapter II—The dependence of the weather on pressure formations and air streams induced thereby—to discuss the problems of weather forecasting from synoptic weather charts. His method of developing the subject is quite naturally that of an instructor in meteorology.

He begins with the fundamental concepts of air movement as dependent upon the pressure distribution with such modifications as are introduced by surface friction, the rotation of the earth on its axis, and other influences, and these are clearly developed with the help of mathematical formulae, diagrams, and weather charts, the latter rather highly idealized with relation to air streams.

Very early in the discussion the results put forward by the Bjerknes school of meteorologists are considered and discussed, the author finding supporting evidence and illustrations in kite flights made in continental Europe. This discussion naturally leads to a consideration of the theories of origin of cyclones and anticyclones. A very full exposition of the Bjerknes wave theory is given and also of Exner's so-called drop theory. Since the latter is perhaps not well known to readers of the REVIEW in this country a brief abstract is given in the following paragraphs.

According to Exner, in the original stationary condition the isotherms and the isobars run parallel to each other. North of the line of discontinuity pressure is relatively high; south thereof relatively low. Normally polar air masses have an east-west movement. These winds, however, meet obstacles to their free and unobstructed westward movement, as on the east Greenland coast, Spitzbergen, and elsewhere in high latitudes. The winds are then deflected toward the south by the configuration of the earth's surface.

Since these masses of cold air by reason of their greater density are associated with higher pressure, the isobars in accordance with the deflection of the winds become curved toward the south. In the advanced stage the tongue of cold air forms more and more an inclosed center of high pressure with anticyclonic movement.

The warm west winds which here have been lifted from the ground by the cold air masses still blow (aloft) over the tongue of cold air and on its front side exerts a suction effect on the lower masses of warm air similar to that observed on the leeside of mountains on the passage thereover of the wind. As a result, this suction effect will produce on the front side of the tongue of cold air a dynamic pressure diminution which intensifies the already present low pressure thermally caused.

On the front side there are supplied to this cyclone thenceforth additional warm air masses. Thus, the cyclonic information acquires new energy through the intensifying of the temperature contrast.

Finally, the upper wind blowing over the tongue of cold, together with the movement of the lower cold and warm air masses resulting from the cyclonic formation, produce a migration toward the east. After the tongue of cold air has moved eastward of the point of invasion the earlier stationary condition gradually reestablishes itself until marked temperature contrasts have again developed, which produce a further sudden advance of cold.

In this way the inrushes of cold and the cyclonic formations become a periodic process which recurs at intervals at certain definite places on the earth.

Since the cold air masses disengage themselves droplike from the polar reservoir of cold, Exner's theory is called the "drop" theory of cyclones in contrast to Bjerknes wave theory.

The author makes the distinction that both the Bjerknes and the Exner theories explain the origin only of one group of cyclones, viz, that which is found in the lower levels—2 to 3 km. where the pressure differences are thermally produced.

It is not clear just how a distinction is to be made in actual forecasting between the influence of the two respective groups—those originating in the lower levels and those having their origin in the stratosphere.

The closing chapter on "long-range weather forecasting" brings forward little that is new or suggestive, perhaps for the very good reason that with the exception

[1] Wettervorhersage, W. Georgii, Dresden und Leipzig, 1924.